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Agroforestry-Based Land Management in the Food Estate Area of Ria-Ria Village, Pollung District, Humbang Hasundutan Regency, North Sumatra

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Abstract. Agroforestry is a land use pattern that combines agricultural and forestry crops on the same land with spatial and temporal arrangements. Ria-ria Village, Pollung District, Humbang Hasundutan Regency is one of the villages designated by the government to be one of the Food Estate areas in North Sumatra which is expected to be able to produce quality agricultural products that can be marketed not only locally but also outside the region. The management of this food estate needs an environmentally friendly concept for the sustainability of natural resources and the environment of the village area. Service activities carried out by socializing agroforestry patterns to the Tani Ria Kerja Community Group, planting trees with a hedge plant model around the land. The types of trees planted in this service activity are Avocado (*Persea americana*) and Suren (*Toona sinensis*).

Keyword: Agroforestry, Services

Abstrak. *Agroforestry merupakan pola penggunaan lahan yang menggabungkan tanaman pertanian dan tanaman kehutanan pada lahan yang sama dengan pengaturan ruang dan waktu. Desa Ria-ria, Kecamatan Pollung, Kabupaten Humbang Hasundutan merupakan salah satu desa yang ditunjuk oleh pemerintah menjadi salah satu wilayah Food Estate di Sumatera Utara yang diharapkan mampu menghasilkan produk pertanian yang berkualitas yang mampu dipasarkan bukan hanya secara local namun juga keluar daerah. Pengelolaan lahan food estate ini perlu konsep yang ramah lingkungan demi keberlanjutan sumberdaya alam dan lingkungan wilayah desa. Kegiatan pengabdian yang dilakukan dengan mengadakan sosialisasi pola agroforestry kepada Kelompok Tani Ria Kerja, Penanaman pohon dengan model tanaman pagar di sekitar lahan. Adapun jenis pohon yang ditanam pada kegiatan pengabdian ini adalah Alpukat (Persea americana) dan Suren (Toona sinensis).*

Kata Kunci: *Agroforestry, Pengabdian*

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1 Introduction

Agroforestry is a land use system that combines woody plants (trees, shrubs, rattan, etc.) with non-woody plants or can also be with grass (pasture), sometimes there are components of livestock and other animals (bees, fish) to form ecological and economic interactions between woody plants and other components [1]. Agroforestry is a form of land management that has been carried out by the community since ancient times. The most obvious and easy-to-use criteria for classifying agroforestry systems are [2]: arrangement of its components according to time and place (structure), importance and role of components (functions), production objectives or system outputs (outputs), socio-economic characteristics , and its ecological basis. The composition of plant species that are on the same land can be arranged in such a way so as not to interfere with one another. On agroforestry land, Multy Purpose Tree species are usually planted.

Multi Purpose Tree Species (MPTS) is a land management system where various types of wood are planted and managed, not only to produce wood, but also leaves and fruits that can be used as food or animal feed [3]. Types of MPTS include Avocado, Palm Sugar, Bamboo, Cempedak, Clove, Cashew, Jengkol, Ylang, Cinnamon, Longan, Mango, Jackfruit, Pete, Rambutan, Breadfruit, Neem, Tamarind, Gayam, Nutmeg, etc.

Ria-ria Village, Pollung District, Humbang Hasundutan Regency is one of the villages designated by the government to be one of the Food Estate areas in North Sumatra which is expected to be able to produce quality agricultural products that can be marketed not only locally but also outside the region. The management of this food estate needs an environmentally friendly concept for the sustainability of natural resources and the environment of the village area.

The Ria-ria Village area is one of the agricultural areas where the population is very dependent on existing natural resources [4]. Land management is usually by monoculture. The Ria-ria Village area is one of the locations designated by the government as the location of the “Food Estate”. This food estate was originally a non-abandoned area, protected forest and production forest. The goal of developing a Food estate by the government is food security where the ultimate goal is to improve the welfare of the surrounding community. Monoculture cropping patterns will open up opportunities for land degradation and cause the ecological function of the area to be disturbed. The erosion of soil due to open areas, residues of chemical fertilizers and pesticides will be the biggest threat of ecosystem damage [5].

Efforts that can be made to increase farmer resources in Ria-Ria Village, Pollung District, Humbang Haangkalan Regency are through mentoring and training in Community Service activities [6]. The Devotion Team comes from the Faculty of Forestry who has related fields of knowledge that can manage land optimally without damaging the environment and be sustainable. The types of activities that will be carried out are socializing the importance of agroforestry

patterns in managing land and the importance of planting MPTS types for the availability of food in the form of fruit for the community [7].

2 Methods

This service with the mono year scheme will be carried out for five months, planned to be carried out from July to November 2021. This activity was carried out in Ria-ria Village, Pollung District, Humbahas Regency. North Sumatra Province.

2.1 Methodology

The stages of service that will be carried out to achieve the goals of service are [8]:

a. Socialization of agroforestry patterns as sustainable agricultural patterns in the outskirts of food estates. The form of the agroforestry pattern can be in the form of planting hedges on food estate boundaries. The recommended types of wood are avocado (*Persea americana*), and suren (*Toona sinensis*).

b. The function of this type of avocado is as a hedge plant as well as a fruit plant that can produce fruit as additional income for farmers

c. Planting suren wood (*Toona sinensis*) is a tree that contains surenon which functions as a vegetable insecticide. The leaves of this plant can be used as a source of vegetable pesticides for agricultural activities. The use of botanical pesticides is one solution in sustainable agriculture. In addition, the wood is suitable as a building material, besides using the leaves, farmers can also use the wood for sale.

d. The planting system that will be carried out is to discuss with farmers which lands will be planted and are given offers to farmers for planting with a hedge plant model. Planting with a hedgerow pattern will not interfere with the growth of agricultural commodities.

3 Result and Discussion

3.1 Socialization of Application of Agroforestry Patterns

This community service involves the Ria Kerja Farmers Group and also students from the Faculty of Forestry (Figure 1). Planting activities are carried out with an agroforestry pattern which is expected to be able to increase economic benefits and increase the ecological value of Ria-Ria Village in the future. This outreach activity was attended by the Head of Ria-Ria Village, Perdianus Lumbangaol and also a food estate farmer companion, namely Dodit Manik and also the Ria Kerja Farmer group who are partners in this community service activity.

Figure 1. Socialization of Application of Agroforestry Patterns

This service activity is carried out with a series of activities, namely preparations carried out by students in the field, namely coordinating with village officials, and the local community. Making the planting hole is done before the day of planting. Ajir preparations have been done beforehand to facilitate planting activities.

Agroforestry is a land use system that combines woody plants (trees, shrubs, rattan, etc.) with non-woody plants or can also be with grass (pasture), sometimes there are components of livestock and other animals (bees, fish) to form ecological and economic interactions between woody plants and other components [9].

The planting pattern in Ria-Ria Village is mostly an agroforestry pattern. For the food estate area, it is a monoculture pattern. Trees such as candlenut, avocado, suren, frankincense and cinnamon are often found in the land around community yards. The economic life of the local community is highly dependent on the potential of existing natural resources. One type of native plant that is mostly produced from Ria-Ria Village is andaliman (*Zanthoxylum acanthopodium*) [10].

3.2 Tree planting

The planting pattern carried out around the land is an agroforestry pattern with a hedge plant pattern. The trees planted during the community service activities included avocado and suren (Figure 2). Avocado is a type of fruit plant that is suitable for highland areas and is a type of Multipurpose Tree Species (MPTS). MPTS is a type of tree that has many functions, for example, avocados produce wood and fruit, avocado leaves are also used as medicinal plants. The type of suren tree also benefits from its wood as a building material, the leaves can also be used by farmers as a vegetable pesticide. Tree planting is done with an agroforestry pattern. Agroforestry is a land use system that combines woody plants (trees, shrubs, rattan, etc.) with non-woody plants or can also be with grass (pasture), sometimes there are components of livestock and other animals (bees, fish) to form ecological and economic interactions between woody plants and other components [1].

Figure 2. Tree planting in the food estate area

The service location is a food estate area, which is an open area with the aim of planting seasonal crops. So the suitable agroforestry pattern is the hedgerow pattern. Fence cropping pattern according to [6] Tress along border, namely the pattern of planting trees at the edge of the land and agricultural plants in the middle of the trees planted around the land, usually functioned as a fence or land barrier.

According to the research of Idris et al. (2019) In Polewali Mandar Regency, the trend of economic motivation influences farmers to choose cropping patterns and the agroforestry pattern that contributes the largest income is the agroforestry pattern A (Agrisilviculture A tress Along Borders) with an average income of Rp. 14,873,222 with a percentage of 28.58%. There are 4 types of agroforestry patterns in Polewali Regency, namely (a) Agroforestry A (Agrisilviculture Atress Along Borders), (b) Agroforestry B (Alternate Rows Agricultural), (c) Agroforestry C (Agrisilviculture Alley Cropping) and (d) Agroforestry Pattern D (Agrisilviculture Mixture Random)

3.3 Avocado Tree (*Persea americana*)

One type of plant grown at the service location is avocado (*Persea americana*). Andanjani, et al (2020) research states that the average income or profit of avocado farming in Ngliman Village, Sawahan District, Nganjuk Regency, in one year is IDR 9,624,550, per hectare.

3.4 Suren tree (*Toona sinensis*)

T. sinensis is one of the types of plants planted in this service activity. In Ria-Ria Village itself, suren plants around the community yard. Suren is a versatile plant where the wood can be used as carpentry wood, the young leaves can be used as skin vegetables and the roots can be used as diarrhea medicine (Heyne, 1987). The extracted leaves and bark can be used as vegetable biopesticides for agricultural crops (Hidayat and Kuvaini, 2005).

T. sinensis can grow at an altitude of 350-2,000 m above sea level spread from India, Nepal, China, Bhurma, Thailand, Malaysia and Indonesia (Hidayat, 2010). Suren with a light canopy is

very suitable to be planted as a type of protective plant. So in this community service activity, suren is planted around the residents' yards and as a hedge plant around the food estate area of Ria-Ria Village

4 Conclusion

Service activities carried out by socializing agroforestry patterns to the Tani Ria Kerja Community Group, planting trees with a hedge plant model around the land. The types of trees planted in this service activity are Avocado (*Persea americana*) and Suren (*Toona sinensis*).

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